Genetics Test

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Objectives:

1. SWBAT know the definitions of dominant and recessive genes.
2. SWBAT determine what phenotype an organism has by looking and the alleles in the genotype.
3. SWBAT describe the impact independent assortment has on genetic variation from one generation to the next.
4. SWBAT define independent assortment.
5. SWBAT define incomplete dominance and codominance.
6. SWBAT determine what phenotype an organism has by looking at the genes in its genotype.
7. SWBAT define gene and allele.
8. SWBAT compare and contrast alleles and genes.
9. SWBAT describe segregation.
10. SWBAT relate segregation to genetic variation.
11. SWBAT define true breeding.
12. SWBAT determine what the genotypes and phenotypes of offspring are from true breeding strains.
13. SWBAT construct punnett squares and fill out the results.
14. SWBAT interpret what the results of the punnett square mean.
15. SWBAT compare and contrast phenotype and genotype.
16. SWBAT define phenotype and genotype.
17. SWBAT compare and contrast homozygous and heterozygous.
18. SWBAT define homozygous and heterozygous.
19. SWBAT describe the impact crossing-over has on genetic variation.
20. SWBAT illustrate how crossing-over works.
21. SWBAT define homologues.
22. SWBAT describe how homologues interact.
23. SWBAT analyze a chromosome map and determine irregularities and the sex of the organism.
24. SWBAT define gene map as a term.
25. SWBAT define linkage as it relates to genetics.
26. SWBAT describe how linkage affects organisms.

Teacher’s Exam Key

\*note: The number after each question, the number in parenthesis correlates to the

objective number in the above list.

Multiple Choice: Circle the best answer(s) for each question. The multiple answer questions may have more than 2 answers. \*Total is 6 points.

1. Which answer best describes the relationship between a dominant and a recessive allele on homologous chromosomes: (1,2) (1 point)
   1. The recessive allele is expressed while the dominant allele is not.
   2. The dominant allele is expressed the same as the recessive allele.
   3. The dominant allele is expressed while the recessive allele is not.
   4. The dominant allele nor the recessive allele are expressed.
2. In a punnett square, which term best describes a parent that has two of the same alleles for one trait? (11) (1 point)
   1. Codominance
   2. True breeding
   3. Incomplete dominance
   4. Hybrid
3. Circle all answers that are true about alleles and genes: (8) (2 points)
   1. Different forms of genes are alleles
   2. One allele can code for different genes
   3. Different alleles correspond to many genes
   4. One gene can have several different alleles
   5. An allele is a type of gene
4. Circle all answers that are true about genotype and phenotype: (15) (2 points)
   1. Phenotype determines genotype
   2. Genotype is described in a gene map
   3. Genotype determines phenotype
   4. By looking at the phenotype, the genotype can be determined
   5. By looking at the genotype, the phenotype can be determined

Matching: Write the letter of the definition that best defines the term. Each letter will only be used once and each one is worth 1 point. \*Total 14 points

\_\_C\_\_ 5) Homozygous (18) A) Different forms of genes

\_\_H\_\_ 6) Heterozygous (18) B) Sections of DNA that codes for a trait

\_\_N\_\_ 7) Homologues (21) C) Organism with two identical alleles

­­\_\_M\_\_ 8) Linkage (25) D) Genetic makeup

\_\_I\_\_\_ 9) Phenotype (16) E) Alleles of one trait sort separately from

alleles of another trait

\_\_D\_\_ 10)Genotype (16) F) One allele not completely dominant over

another

\_\_L\_\_ 11) Gene map (24) G) The allele expressed instead of its

homologue

\_\_B\_\_ 12) Gene (7) H) Organism with two different alleles

\_\_A\_\_ 13) Allele (7) I) Physical characteristics

\_\_E\_\_ 14) Independent Assortment (4) J) Both alleles contribute to the phenotype

\_\_G\_\_ 15) Dominant (1) K) The allele not expressed in the phenotype

\_\_K\_\_ 16) Recessive (1) L) Shows relative locations of genes on

chromosomes

\_\_F\_\_ 17) Incomplete Dominance (5) M) Genes located on the same chromosome

\_\_J\_\_\_ 18) Codominance (5) N) Two corresponding chromosomes

Answer the following questions with complete sentences and correlating illustrations. Make sure you include everything the question asks for. \*Total 30 points.

19) Two true breeding parents mate, the mother with the ‘A’ allele and the father with the ‘a’ allele. Create the punnett square to show what the offspring genotypes are and describe how many of each phenotype there are in the parents and offspring. (6, 12, 13, 14, 15, 22) (5 points)

|  |  |  |
| --- | --- | --- |
|  | A | A |
| a | Aa | Aa |
| a | Aa | Aa |

The mother: Dominant phenotype

The father: Recessive phenotype

The offspring: Dominant phenotype

20) Which offspring from question are homozygous and which are heterozygous? Support your answer with a description. (17) (3 points)

The parents: AA homozygous dominant, aa homozygous recessive

Offspring: All Aa heterozygous

21) Two organisms with the alleles AB and AB mate. Alleles ‘A’ and ‘B’ are codominant alleles. Draw and fill out a punnett square to show offspring and list all organisms that are homozygous, heterozygous and how the alleles of each organism (parents and offspring) will be expressed in its phenotype. (2, 5, 13, 14) (6 points)

|  |  |  |
| --- | --- | --- |
|  | A | B |
| A | AA | AB |
| B | AB | BB |

(2 points)

The two parents are heterozygous and will express both A and B alleles in their phenotype.

One offspring is homozygous AA and will express only the A allele in its phenotype.

Two offspring are heterozygous AB and will express both A and B alleles in their phenotypes.

One offspring is homozygous BB and will express only the B allele in its phenotype. (4 points)

22) Why is crossing over important? Please illustrate what crossing over is. (19, 20) (3 points)

Genetic variation, diversity, making offspring different than parents and siblings. (1 point)

 (2 points)

23) Compare and contrast linkage and independent assortment. Can one disrupt the other? (4, 25, 26)(3 points)

Both linkage and independent assortment describe the inheritance/movement of genes from one generation to the next in relation to one another. (1 point)

Linkage causes two or more genes to more likely show up together in offspring.

Independent assortment describes how genes move from generation to generation independently of one another. (1 point)

Linkage can disrupt independent assortment because it causes genes to be inherited more likely together rather than be inherited independently. (1 point)

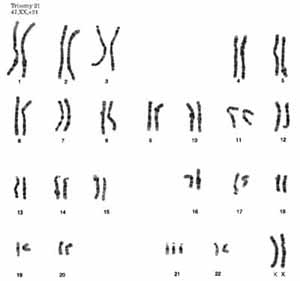
24) There are three terms that are very important for genetic variation among organisms. List these terms and describe how they are important to the genetic variation of a population. (3, 9, 10, 19) (6 points)

Segregation(1 point) – alleles of genes present in a parent separate into different gametes so that each offspring gets a different allele of a gene increasing variation. (1 point)

Crossing-over(1 point) – exchanges genes on two different homologues to make resulting offspring different than the original chromosome produced by the parents and increasing variation. (1 point)

Independent assortment(1 point) – alleles sort independently of one another from one generation to the next, making next generation a different mixture of genes than the parents and causing variation. (1 point)

25) Use the following gene map and determine how many chromosomes there are, where the abnormalities are, the sex of the organism, and what type of organism it is. (23) (4 points)



47 chromosomes, human (1 point)

Female organism with 2 X chromosomes (1 point)

Abnormality at location 21, where there are 3 chromosomes present instead of 2 (trisomy). (2 points)

Possible E.C. What does the abnormality you found cause?

Down’s Syndrome